## CLAIMS

[1] A light-collecting device which collects incident light, comprising:

a substrate into which the incident light is incident; and

above said substrate, a plurality of light-transmitting films formed in a region into which the incident light is incident,

wherein said light-transmitting film forms a zone in which a width of each zone is equal to or shorter than a wavelength of the incident light, and

the plurality of said light-transmitting films form an effective refractive index distribution.

[2] The light-collecting device according to Claim 1,

wherein in the plurality of said light-transmitting films, each light-transmitting film has a constant line width.

[3] The light-collecting device according to one of Claim 1 and Claim 2,

wherein in one of areas of said light-transmitting films divided by a length equal to or shorter than the wavelength of the incident light, a sum of the line widths of the light-transmitting films is smaller than a sum of the line widths in another one of the areas that is closer to a zone center.

[4] The light-collecting device according to Claim 3,

wherein the zone model is concentric circles.

[5] The light-collecting device according to Claim 3

wherein

$$\Delta n(r) = \Delta n_{\max}\left[1 + m - n_1 r^2/(2\lambda f)\right]$$

is approximately satisfied, where $\lambda$ is the wavelength of the incident light, $f$ is a focal length, $n_0$ is a refractive index of a

medium on a light incoming side, $n_1$ is a refractive index of a medium on a light outgoing side, $m$ is a non-negative integer, and a maximum value of a refractive index of said light-transmitting film is $n_0 + \Delta n_{\max}$, when a difference from the $n_0$ is $\Delta n(r)$.

[6] The light-collecting device according to Claim 3,

wherein

$W = a(1 + m - n_1 r^2 /(2rf))$

is satisfied, where $\lambda$ is the wavelength of the incident light, $f$ is a focal length, $a$ is a width of the divided area, $n_1$ is a refractive index of a medium on a light outgoing side, $m$ is a non-negative integer, and $r_m$ is a Fresnel zone boundary, that is a natural number which satisfies $r_m^2 = 2m\lambda f / n_1$, taking that a sum $W$ of the line widths of said light-transmitting films in one of the divided areas having an inner radius $r$ where $r$ is larger than $r_m$ and smaller than $r_{m+1}$.

[7] The light-collecting device according to Claim 1,

wherein heights of said light-transmitting films are constant in a direction normal to said light-transmitting films.

[8] The light-collecting device according to Claim 1,

wherein a shape of cross sections of said light-transmitting films in a direction normal to said light-transmitting films is rectangular.

[9] The light-collecting device according to Claim 1,

wherein each of said light-transmitting films includes one of $TiO_2$, $ZrO_2$, $Nb_2O_5$, $Ta_2O_5$, $Si_3N_4$ and $Si_2N_3$.

[10] The light-collecting device according to Claim 1,

wherein each of said light-transmitting films includes one of $SiO_2$ doped with B or P, that is Boro-Phospho Silicated Glass, and

Teraethoxy Silane.

[11] The light-collecting device according to Claim 1,

wherein each of said light-transmitting films includes one of benzocyclobutene, polymethymethacrylate, polyamide and polyimide.

[12] A solid-state imaging apparatus comprising unit pixels that are arranged in a two-dimensional array, each unit pixel including a respective light-collecting device,

wherein said light-collecting devices comprises:

a substrate into which the incident light is incident; and

above said substrate, a plurality of light-transmitting films formed in a region into which the incident light is incident,

wherein said light-transmitting film forms a zone in which each zone is equal to or shorter than a wavelength of the incident light, and

the plurality of said light-transmitting films form an effective refractive index distribution.

[13] The solid-state imaging apparatus according to Claim 12,

wherein line widths of said light-transmitting films are different between said light-collecting devices of said unit pixels located close to a zone center and said light-collecting devices of said unit pixels located near the zone periphery.

[14] The solid-state imaging apparatus according to Claim 12, comprising at least:

a first unit pixel for first color light out of the incident light; and

a second unit pixel for second color light which has a typical wavelength that is different from a typical wavelength of the first

color light;

wherein said first unit pixel includes a first light-collecting device, and

said second unit pixel includes a second light-collecting device in which a focal length of the second color light is equal to a focal length of the first color light in said first light-collecting device.

[15] The solid-state imaging apparatus according to Claim 12,

wherein sums of the line widths of said light-transmitting films in each of the divided areas are different between a light-collecting device of said unit pixel located in a center of a plane on which said unit pixel is formed and a light-collecting device of said unit pixel located in the periphery of the plane.

[16] The solid-state imaging apparatus according to Claim 12,

wherein a plane on which said pixels are formed is divided by concentric areas from a center of the plane to the periphery,

focal lengths of said light-collecting devices of said unit pixels belonging to a same area are equal, and

focal lengths of said light-collecting devices of said unit pixels belonging to areas other than the same area are different.

[17] The solid-state imaging apparatus according to Claim 12,

wherein each unit pixel further includes:

a wiring layer having an aperture above a light-receiving device, on a light-outgoing side plane of said light-collecting device, and

a focal point of light collected by said light-collecting device matches a position of the aperture of said wiring layer.

[18] The solid-state imaging apparatus according to Claim 17,

wherein in said unit pixels located in a center of a plane on

which said unit pixels are formed, a central axis of each of said light-receiving devices is placed to match a central axis of each of said light-collecting devices, and

in said unit pixels located in the periphery of the center of the plane, a central axis of each of said light-receiving devices and a central axis of each of said light-collecting devices are placed toward the center of the plane.